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STRUCTURES OF PRIVATE HOME BUILDING IN RURAL AREAS IN HUNGARY

Magyar Epitoipar
[Hungarian Building Industry], No 8, 1955, Budapest, Pages 339-353

Ferenc Kiss, text
Erno Sudi, Drawings

The on the spot data collection of the private home building program has been completed in 18 megye and 48 jaras by employees of the planning offices from January to March of the current year. This project was accomplished with the support of the Ministry of Housing and Public Construction and under the auspices of the Association of Architects.

The primary aim of the collection of the above data is to become even more thoroughly familiar with the needs of the home builder and to adjust building plans and blueprints according to future needs and possibilities of the builders and to put these plans at the disposal of the individual builder; secondly: the mapping out and organization of such factors as real estate and loans, the procedure for obtaining building permits, the supply and distribution of materials, technical control, planning, as well as the role of the authorities and their cooperation, etc.

We are, however, discussing only one phase of the collection of information in this article, and that is, information concerning structural planning.

It was generally possible to establish from the collected data that home building for private owners has its roots in structural and economic factors; it stands on the threshold of revolutionary change and because of the lack of planned preparation and direction it is struggling with the difficulties of an interim phase of development. The most significant difficulty is created by the lack of wood. For the first time in history the expanded building industries need for wood, for roofing and roofing frame cannot be covered either by domestic production or by import.

Among those products which could be substituted for wood, shaped-iron would be easy to transport and store and at the same time it would act as an ideal substitute for wood since building procedures and methods with this material are the same as with wood; however, it is not available for this purpose due to presently restricted manufacturing capacity.

The current industrial capacity for mass production of reinforced concrete would satisfy the need; however, its comparatively great weight, its sensitivity to transport and the greater professional skill needed to build with, would demand a change in the basic concepts (individual construction projects distant from one another both in time and space, transport by horsedrawn wagons and simple construction methods) of the industry.

The results of the changes of circumstances today cannot be measured. It is possible that as a result of the economic development of new structures the gently sloping roof will replace the traditional shapes. Aside from this fact the preparation of reinforced concrete roofing and glued, Ekin [sic] or bituminous peat insulation is considerably lower in both costs and labor than reinforced concrete ceilings and roof supporting frame to such an extent that the difference in cost makes possible the construction of a small storage room equal in value to the roof.

Depending on the extent that traditional forms or climatic conditions

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foundations are good for 100 years and on the basis of the testimony of witnesses that the buildings will be flawless -- it is permissible to build them. This would be the joint task of the ETI-VKGM and the water control authorities.

(3) The introduction of the "Sandor Type" coal-dust brick baking for the townships which do not have local materials satisfactory for foundation building. A clarification as to the responsible authority is necessary, since coal-dust brick baking got a good start in the forties and proved to be economical and extremely cheap, but now as the result of the lack of responsible authority it is about to be forgotten.

(4) Working out of regulations for the preparation of local industrial by-products such as earth-concrete, slag-concrete, lime-slag, etc, as well as preparing maps showing the composition of local soil. Research task (ETI-VKGM).

(5) The collection and preparation of methods of construction which need no foundations. For instance in the vicinity of Szekszard it is traditional and still practicable to build houses without foundations on earth-fills with steep outer slopes and under comparatively wide eaves.

(6) The introduction of less costly and more economical methods of foundation construction utilizing brick stone and concrete.

(7) Mechanized foundations construction systems, with machines in the hands of jaras and council construction associations to be formed.

Situation

Adobe: Adobe preparation is done exclusively by hand with the use of the simplest frame. The method requires a great deal of labor and is unjustifiably high in cost. Average cost 135 forints per 1,000 pieces.

In place of the old, clay-covered white-washed exteriors, the application of noble or stone-dust plaster is almost in general use. The correct method of its correct application, however, is not known; among the few places where it is applied it will in many cases peel off in big pieces.

Specification of foundation plans and methods. The wide three-section window, the glassed-in veranda with a large opening are not usable because of the composition of adobe. The generally used mixed materials such as brick pillars and adobe walls cause cracks because of different settling speeds. This problem has not yet been solved technically.

The locally baked "Sandor" type brick is used in one or 2 districts in diminishing quantities.

The factory-made brick cannot squeeze out the use of adobe in backward areas because of its greater cost. Compared to the modest amount of fuel available the necessary heat storage and insulation, the cessation of large scale brick production appears unfortunate.

In some places lime-slag (troska) wall is used (Diosgyoer, Ozd). However, this is not everywhere where slag is available. In some places they build mixed walls simply out of furnace slag blocks.

Action to be Taken

Preparation of a domestic adobe map, with data pertaining to communities (Kozseg), giving the quality of the adobe indicating whether it can be used

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immediately or only after thinning; furthermore, which wall construction system is the most appropriate (adobe, brick, pounded wall, stacked-wall) and which is customary.

The data needed for the preparation of the map is to be collected on the basis of mutually prepared points of view and an established questionnaire of the EM -- VKGM. The local organ of the VKGM of EM would be the most convenient for the collection of actual data. Working up of the collected material could be the task of the ETI in the event that separate adobe-planning and advisory councils do not develop as in East Germany.

The technical preparation of the exceptionally rich and successful domestic adobe construction industry which is different from the adobe construction methods of any other people. The task is urgent. Although the thought sometimes comes forth, unfortunately until now it has not been accomplished, although the master artisans among the people are disappearing. A solution would be to have the architects' association take the wall construction systems of 2 or 3 regions and work these up in an exemplary form in the course of this year's summer memorials works. On the basis of the sample the local organs of the VKGM would accomplish the collection of data and its central office would work them out.

Simultaneously with domestic adobe construction developments, foreign, for instance, East German developments based on engineering considerations, checked by experimentation. literature and local studies should be examined. (See the explanation of G. Berkenyi below).

The hiring of equipment on the local (Tuzep) construction material storage lot which will decrease the need for labor keeping in mind the already fixed characteristics of the townships appearing on the adobe map (for instances in an area where gravel is mixed with adobe, regulation mouldings -- instead of an adobe press -- would be used.)

Thus: Multi-section work bench operated by foot. An adobe press of great capacity, capax [sic]. The wider introduction of the "Sandor type" brick baking method (see foundations and foundation walls.) Wooden square mouldings for pounded walls and lime-slag walls.

The development of a mixed adobe and brick wall which needs few bricks, gives a surface that can be plastered both on the inside and the outside and and has an even weight-bearing properties with a great heat storing and insulation capacity while its cost is comparatively low. Regular-size door and window mouldings for pounded walls and lime-slag walls. Manually- and machine-operated adobe mixing machines, etc.

Header

The greatest number of aperture closing structures are constructed with wooden-beam headers, to a lesser extent by home-built reinforced concrete and in still smaller numbers with prefabricated reinforced concrete beams.

The necessary professional skill for inserting steel rods in home-made reinforced concrete is not available so that many broken and cracked headers can be found.

The cost relationship between wooden and prefabricated reinforced concrete headers is worthy of note. For instance let us take the example of a 50 cm-thick pounded wall and a 160 cm opening width; without the cost of transportation, the cost for disjoined wood and reinforced concrete is approximately the same. [see appended figure].

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The use of reed floors has spread widely because of its comparative cheapness.

Actual construction usually takes place as follows: The artisan generally emplaces the beams and the undercoating while the top coating is put on later by the individual builder.

At present, the introduction of reinforced concrete ceiling beams causes great difficulties, although they are usually available on Tuzep construction materials storage lots. The reasons for this are economic, technical and traditional.

According to the above mentioned circumstances the price of reinforced concrete beams is lower than that of wooden ones. Their transportation with horse-drawn wagons is much more difficult and expensive.

Five wagon trips are necessary for transporting the roofing beams for one average-sized house with wooden roofing. Added to this we also have the labor requirements for loading and unloading which is not present in the case of wooden beams. Furthermore, emplacing is the responsibility of the contractor because of the lack of emplacing arrangements. Generally the contractor will try to talk the individual builder out of this partially due to the more difficult work and partially because of an undeniably present accident danger inherent in the labor force without adequate training.

In rural areas the available linings are not bought because of their price and particularly because of the extra cost due to the 60 cm rib distance. The cost then exceeds that which the builder can bear, particularly when considering that wooden beam covering can be solved by domestic labor at a minimum expenditure by the use of waste materials. A significant proportion of the transported beams and linings are already broken or torn on the Tuzep construction material storage lot, a fact which is not conducive to arousing confidence.

The great weakness of the reinforced concrete rib is that it cannot be nailed from underneath so that it is unsuited for attachment to reed floors, boards or stucco work.

The cornice connection work mentioned in the paragraph on cornices is unsolved as well as the fastening of the rafters of the roof frame structure where the attic is constructed without walling up. Thus, the reinforced concrete beam which is to be sold in rural areas has to be made suitable for the above demands or in other words overcome its failings.

It would be advisable for the construction material storage lot or for a suitable advisory enterprise to carry out the transporting and storing for a fair price, or to teach the local artisans by means of a course the methods of transporting, emplacing and building.

From the technical standpoint it is undeniable that the angular "tray" roof is the most practical due to the properties of the adobe wall (the suggestion of Laszlo Miskolozv). It would present the following advantages: Even weight distribution, anchoring without the use of cornices, the possibility of anchoring the rafters by very simple means, a smooth undercovering, insulation and heat storage guaranteed by fills which can be applied as necessary. The disadvantage of its introduction is that very property which is its technical advantage: that by elimination of the local materials -- such as lining, covering and of domestic labor -- it is entirely a product of big industry. As such, it is both more expensive and heavier than the usable local materials. One may expect that the problem of transportation and

storage can be solved by organization on a national scale and either pay for itself in full or at least partially and be brought into circulation in this manner and thus steer the problem of ceiling construction out of its throes and into a healthy course. Until then the popularization and technological development of linings which are more timely and require less labor and which can be domestically prepared are desirable.

Thus on the basis of East German literature on adobe, the adobe lining reinforced by small rods -- which has the advantage over the filleted ceiling or mud-rod ceilingoof a smooth bottom and can additionally be prefabricated and emplaced in a dry state with only thin clay insulation thus bringing in only a small quantity of water -- can also easily be reversed. In the event that a satisfactory work bench or press is utilized, its use of labor is lower, its weight bearing capacity the same and its need for wood smaller [than that of "tray" ceilings].

In order to bring it into use aside from detailed instructions on its preparation, the small artisans will have to be given plans for work benches and forms which can be built domestically. Furthermore, the introduction of wooden lining presses of greater capacity may be rented at the Tuzep constructions material storage lot.

In the event of the lack of reed planks when using the covered beam system for under covering, the introduction of the manufacture of straw adobe plank is desirable. This substance should have the following properties: ability to be prepared domestically; with the exception of not being a weight bearing substance, it has the same advantages as rod reinforced lining and as such, it is economical; it has the same, simple manufacturing advantages and maybe prefabricated domestically.

Adobe, lining, reed planks, straw-adobe planks or reinforced concrete ribs can be used in different ways depending on how their respective forms develop.

Lining can be laid on the top ledge, but not on the bottom one of the "L" shaped beam now being introduced.

Because of its shape and dust catching ledge with a structure which is visible from below, it can only be used in quite unimportant rooms (closets, etc). In order to have a smooth surface both of its positions have to be secured with a thin plank which can be nailed and can be led in next to the rafters.

A roof which is only smooth on its underside can be well constructed out of rolled lining elements. With stakes placed on top, the beams can still be walked on; however, the clay filing securing the upper insulation of the beams demands very cautious use of the attic.

The "F" and "H" beams can be used as the one above not only with rolled, but also with adobe lining.

The previous suggestion of the Mezotero [Field Plan"] should certainly be considered at least for an experimental introduction of the passing value of the usable element factory "type" beams. Mainly because they are perfectly usable and cheapest both from a technical and aesthetic standpoint and convenient for the reception of all structures made of all local materials such as thin wooden planks covered with mud, reed, planks, rolled rods, or lining, brick trays, etc. Its simple form and local production also makes it convenient. It was demonstrated that securing a smooth under surface with reinforced concrete beams was either more difficult or much

more expensive (b) or tied to one or 2 double lining materials and not safe from the point of view of insulation and attic covering (c) (d) or it is too heavy when filled to the smooth upper surface. It is possible that the introduction of ceilings with visible ribbing can be accomplished with success among the older builders particularly if a method is found for the creation of smooth room ceilings (f).

It appears that with the factory ceiling-ribs so far introduced, the main consideration has been the satisfaction of production interests rather than practical considerations.

It can be seen from the above that the task consists of not only the planning of a defined weight bearing structure as light as possible. The ceiling rib is only a part of the entire ceiling construction task and its development has to proceed with the knowledge of locally changing conditions parallel to the solution of problems related to cornices, lining, rafter anchoring, etc.

The reinforced concrete beam can be expected to force slowly the locally prepared and cut wooden beam into the background, but it will probably never force it out entirely. Therefore in order to stop the wastage of valuable wood the builders should be supplied with simple and easily usable measuring tables and publications containing directional theories for saving.

Roof-Frame Structure

Its material was wood in all cases. An overshelming proportion of it was made of pieces of mixed quality, age, grain, and length.

Currently the reverse of the customary planning method is in existence. After obtaining wood and chance measurements which happen to be available the structure is planned with consideration for the material which has been obtained.

These characteristics and the local customs result in exceptionally varied roof shapes.

The saddle-shaped roof is dying out. They remain in large numbers almost exclusively in comb-like or one-story buildings particularly in towns and villages distant from industrial centers. Their builders are generally older persons clinging to tradition.

Part of the objections to the saddle-shaped roof pertains to its form. The thick peak wall on an adobe wall, or an adobe peak wall is not as protected against weather as the house which has eaves around the entire house. The objections pertain partly to the question of supply. Planks cannot be used for peak-walls; long rafters of equal length to the saddle roof are needed, while short boards can be used for the modified tent-shaped roof.

Greater numbers of houses are built with truncated-modified tent shaped roofs.

The modified-tent shaped roof is even more general when compared with the saddle-shaped roof previously discussed.

Frontal houses with square foundation plans are constructed with tent-shaped roofs.

Corner houses are sometimes constructed with identical and sometimes with varying wing widths, with roofs shaped according to the rules of

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Wooden and reinforced concrete structures should be interchangeable. The weight and number of the elements should be comparatively low and the means of attaching them to each other simple. Such, for instance, is the sloping wall system with 3 standardized rigidity distances: in the event that the following types are used: 2.50 m, 3.60 m and 4.10 m: Three types of hip-corners: for standarized lengths; one type of rafter: 4.50 m long; altogether 4 elements.

The necessary 60-190 cm, generally one meter addition to the side of the eaves or ribs can be solved by using waste material found around the house. Short rafter wood can be nailed either to the bunches of wood placed between the teams or attached with a scaffolding screw through holes left for that purpose. Hip corners are held by drawing iron. Rafters can be emplaced with "Housing Plan"-type hitching mechanism. Depending on the necessity according to the measurements of the available wood the rafter can then be pushed up or down. The structure can be built of wood with reinforced concrete corner hipping and wooden rafters or in a different manner with reinforced concrete. The hip corners can be lifted with a 3 meter high trestle or against the forms holding the adobe in the building.

The use of wood is minimum; exact bindings, etc, are not necessary since the settling of the structure is not sensitive.

The extreme importance of this question would justify giving the best statisticians, and planners of the profession the separate planning task and parallel testing of the value of the plans by carrying out experiments.

So much for a very sketchy discussion of the more important structures. As it has been seen, the strictly considered building structure tasks are: the wall, ceiling, and roofing structures. Aside from the above and of perhaps only secondary importance from the building point of view are the health and economic conditions of village civilization. Of particular importance are those domestically or semi-domestically producible fittings which can be worked out in the simple manner of the rural folk and which will bring them closer to the urban way of life. Such facilities as running water, bathing opportunities, and interior toilets which can be installed by domestic labor.

The thought may occur that the current distribution of these is not very timely. Let us not forget, however, that there is already electricity in villages and the inhabitants are purchasing radios and motorcycles. Sanitary fittings have not been installed in villages because no one knows there with what simple implements they can be built. If running water is installed in one village and only one, a speedy enlightenment will occur.

A subjective opinion for the summarization of the above:

I have nearly 2 decades of professional training and experience. I have planned housing developments, hospitals, university buildings and factories. According to what I have established the technical consideration of rural private house construction differ to such an extent from usual problems that, if hoping for minimum success, it could only be solved within the framework of such organizations as the ONCSA [sic] or later FAGI [sic] except that it would require a wider scope than those mentioned. It could be responsible for solving all the tasks connected with widely spread activities in regard to the private house construction project.

Would it perhaps not be best instead of disbanding the FAGI -- which in the long run still best understands local conditions, builders, and widespread rural construction problems -- to strengthen it with valuable

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professionals? One would then give it -- aside from the Private House Construction project -- the additional responsibilities for planning and building model houses, for individual plan preparation and of experimenting with and controlling new structures. It could further be charged with an advisory responsibility, management and village planning projects, and responsibility for the further training of the artisans and builders.

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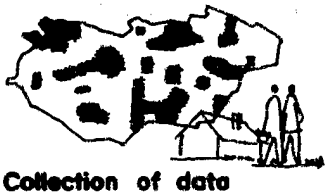
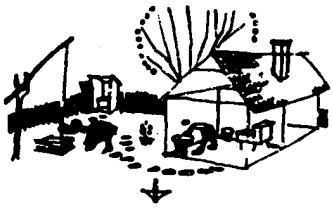
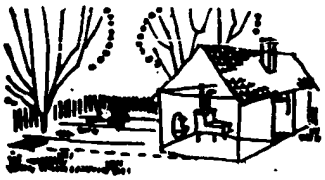


Collection of data





Supplying houses with public works

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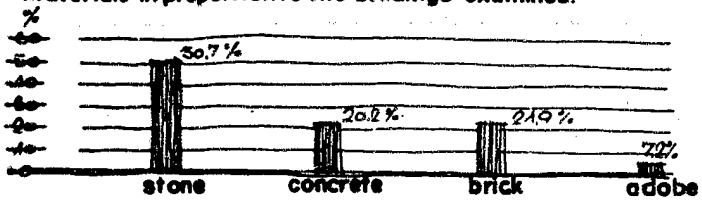
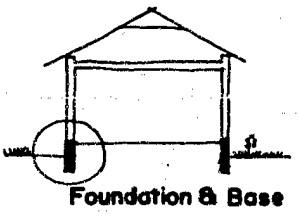
BASE AND FOUNDATION WALLS

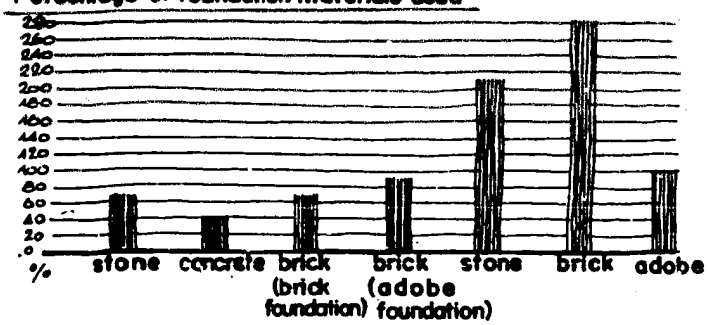
Materials in proportion to the buildings examined:





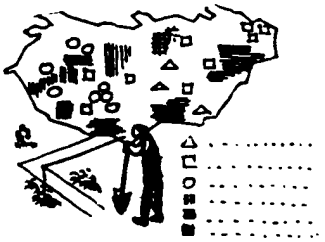
Foundation & Base

Percentage of foundation materials used



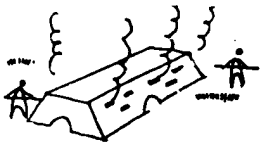
—foundation and base walls——inside wall————

Proportion of absolute costs of foundation, bases, and walls

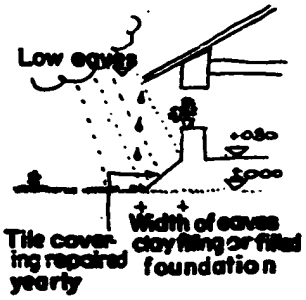


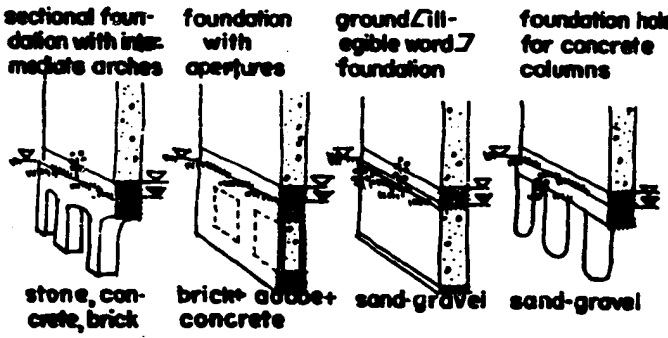
Local materials, foundation construction

Demand for foundation building



Sandor type brick





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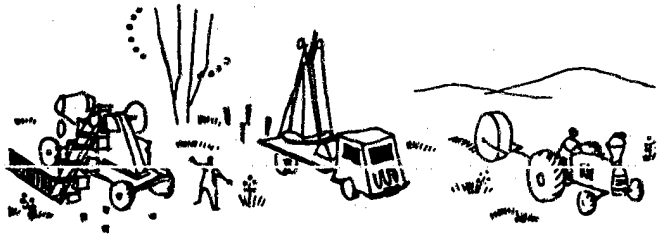
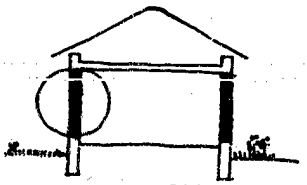


Foundation digging and concrete applying machine

Small concrete stake transport and insertion machine

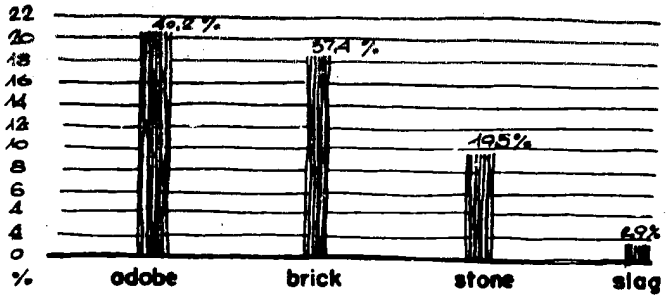
simple heavy ground roller



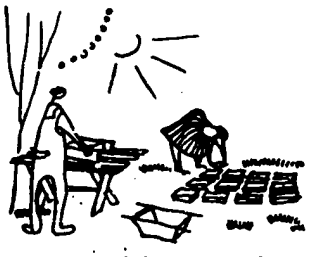
Side-walls

SIDE - WALLS

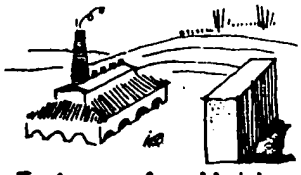
Usable material in proportion to the buildings examined:



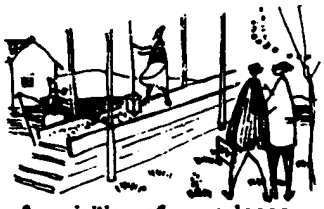
Proportion of wall construction material used.



adobe preparation

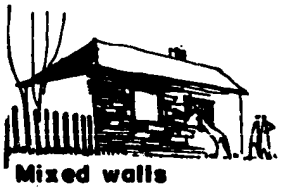


Factory produced brick



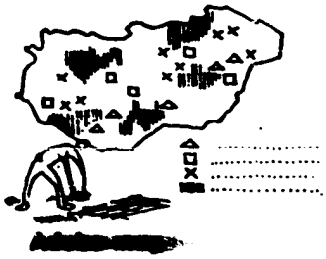
Acquisition of experience

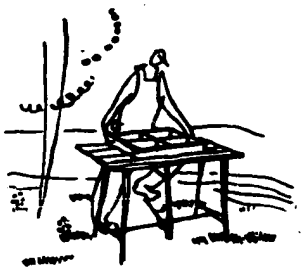
Mixed structure



Mixed walls

Badly-prepared coloring





Foot-operated work bench

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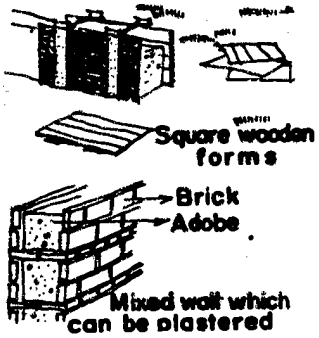
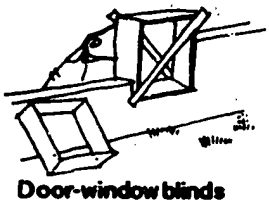
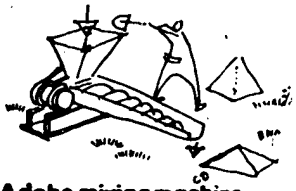
Adobe press

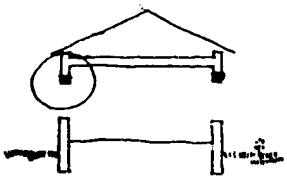




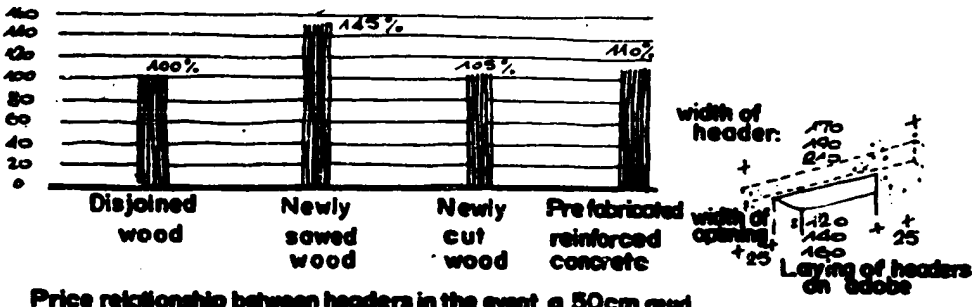
Door-window blinds



Adobe-mixing machine

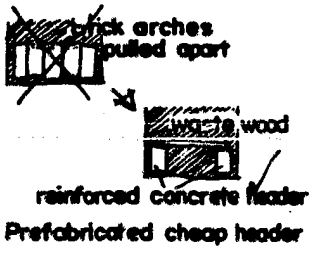


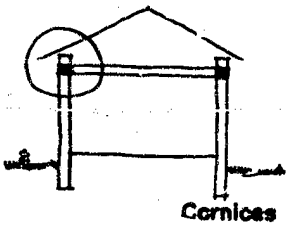
Headers

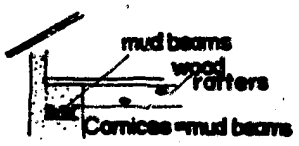


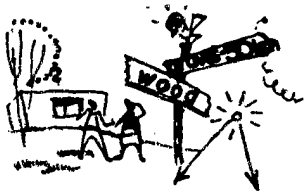
Price relationship between headers in the event a 50cm mud wall and a 160 cm opening are used.

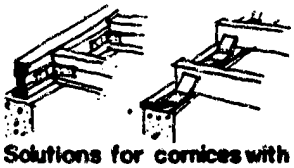
STAT



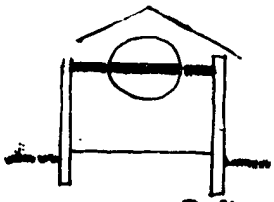




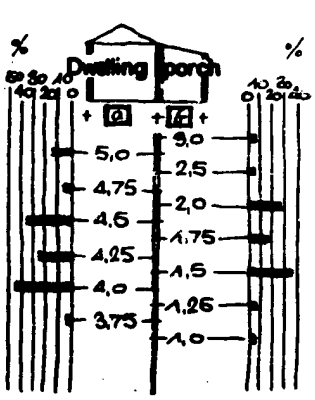


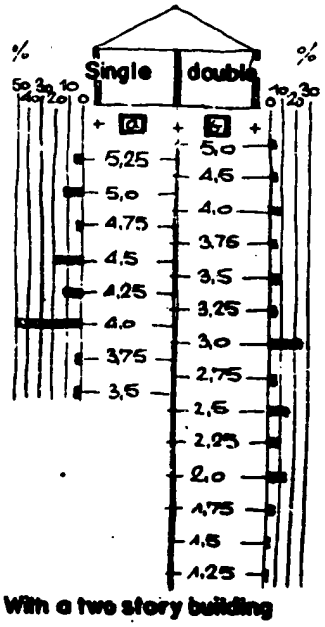


Solutions for cornices with the use of reinforced concrete ceiling beams



Rafters



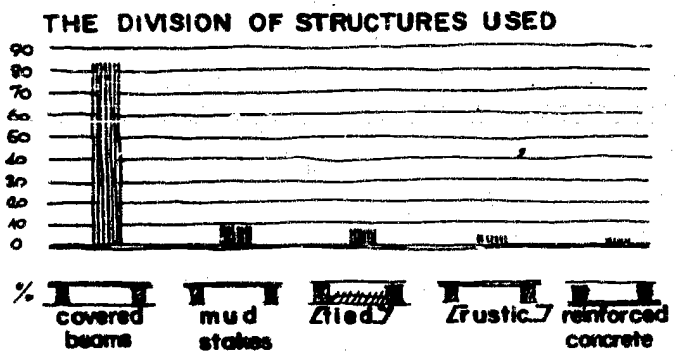


Outline division of the rigid distances used:

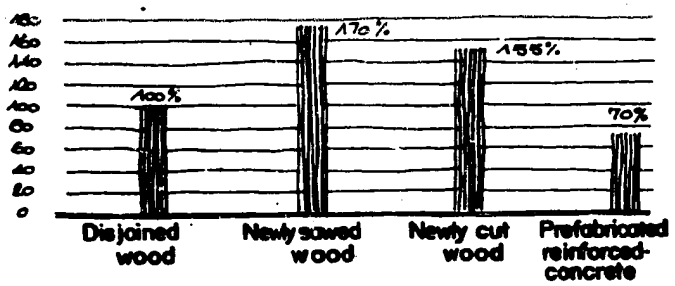
With a one-story building

With a two story building

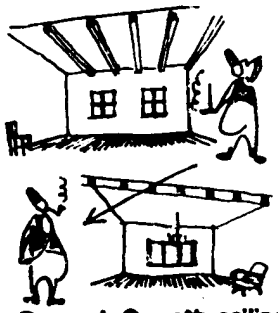
STAT



Percentage-wise proportions of roof used

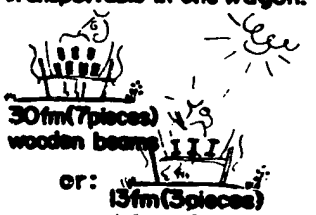


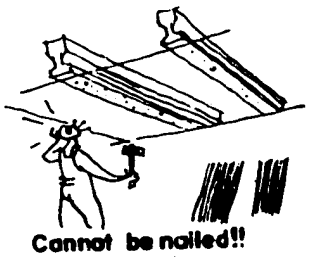
Percentage-wise comparison of ceiling beams



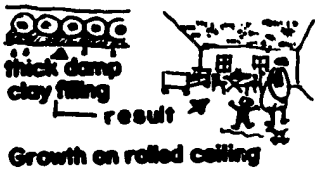
Demand: Smooth ceiling

Transportable in one wagon:



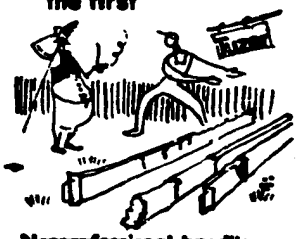


Cannot be nailed!!

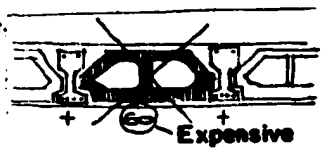


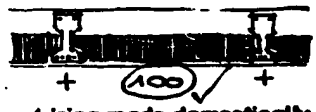
Growth on rolled ceiling

So that:
transporting the latter (without loading) is 2½ times that of the first



Nonprofessional handling



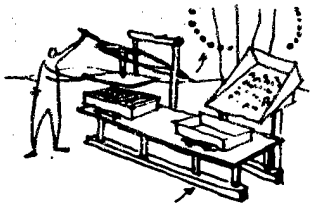


Lining made domestically twice as cheap

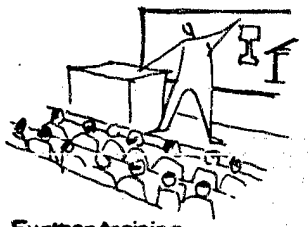
Covered beam ceiling

STAT

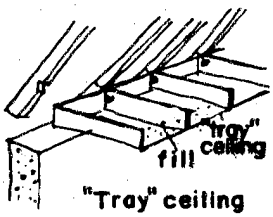
Workbench



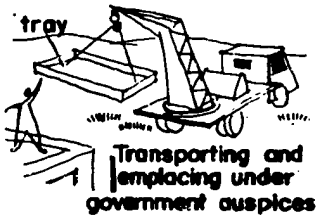
Workbench with press



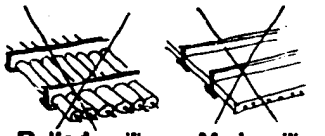
Further training



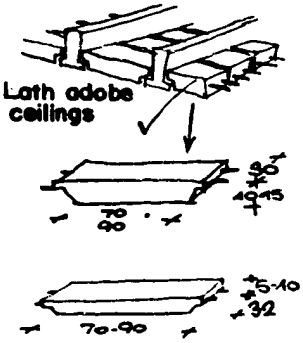
"Tray" ceiling



Transporting and emplacing under government auspices

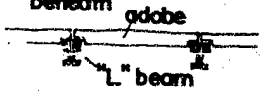


Rolled ceiling Mud ceiling

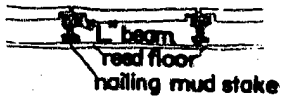


Straw-adobe floor

"L" beam
ⓐwith beam visible from beneath



ⓑsmooth—above & below

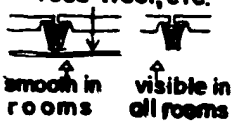


ⓒsmooth on the bottom only

"F" and "H" beams
ⓓsmooth on the bottom only

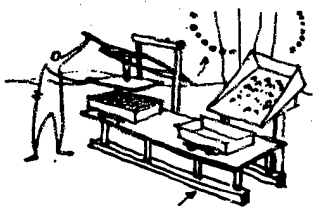
ⓔ"Measuring plan" type

ⓕNailing mud stakes (illegible) reed-floor, etc.

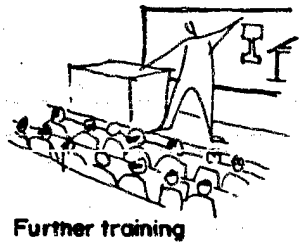


STAT

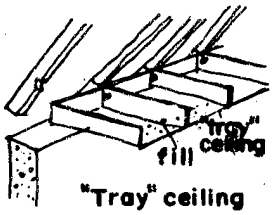
Workbench



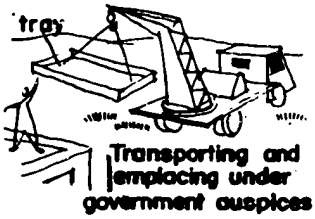
Workbench with press



Further training

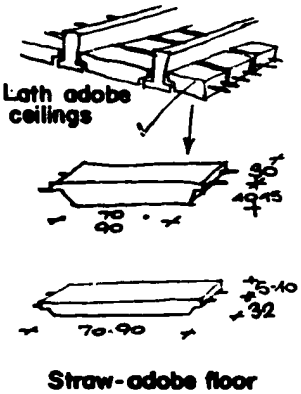


"Tray" ceiling



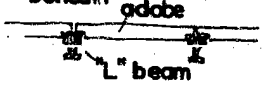
Transporting and emplacing under government auspices

Rolled ceiling Mud ceiling

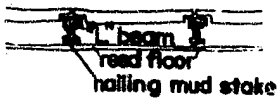


Straw-adobe floor

"L" beam
ⓐwith beam visible from beneath



ⓑ smooth— above & below

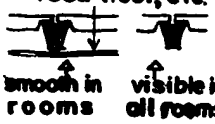


ⓒ smooth on the bottom only

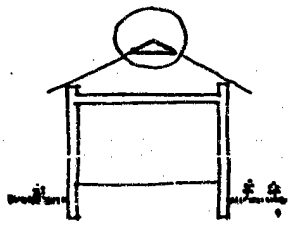
"F" and "H" beams
ⓓ smooth on the bottom only

ⓔ Measuring plan" type

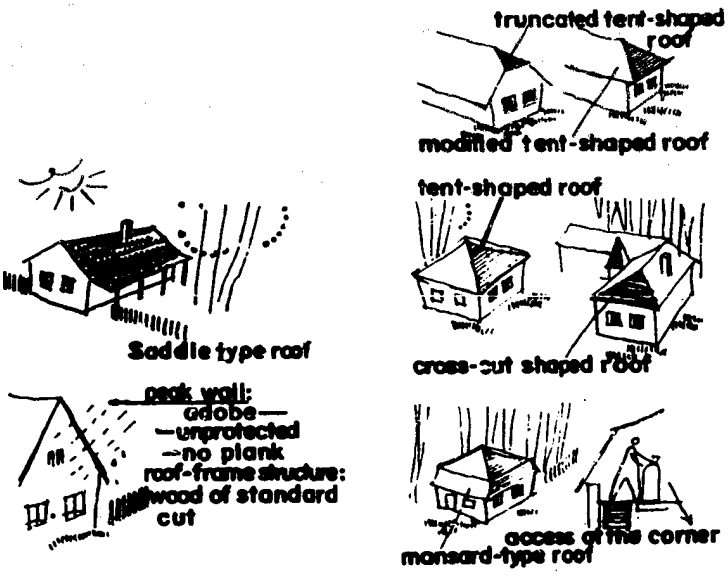
ⓕ Nailing mud stakes
(illegible)
reed-floor, etc.



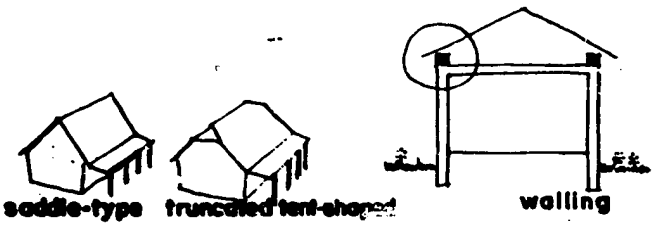
STAT

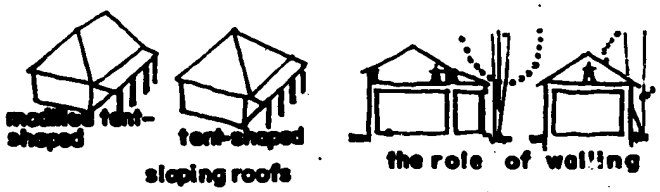


Roof frame

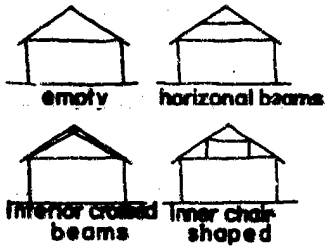


Types of roof

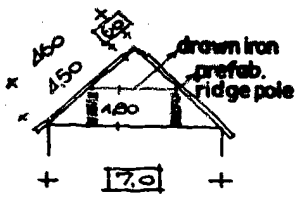


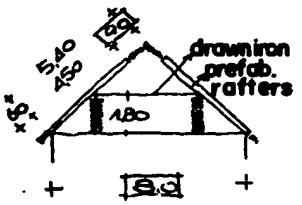


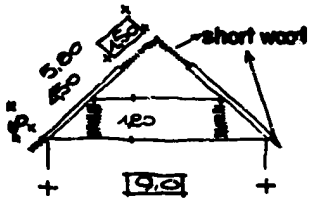
STAT

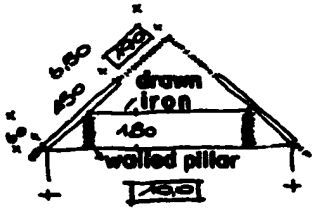


Type of frames

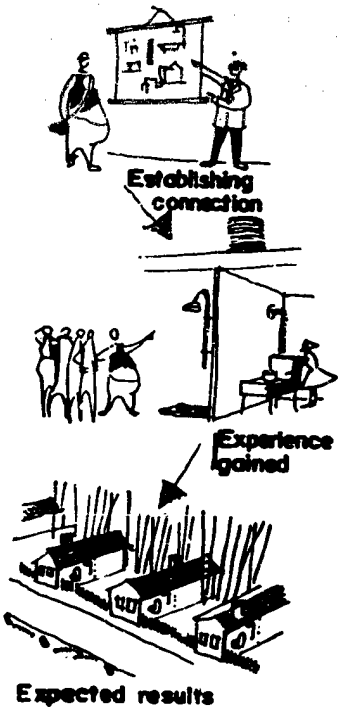








Different width of same type of rafter with supplementary short wood structure



Expected results

* * *